

2016 Schutter Diagnostic Laboratory Annual Report – Summary

The Schutter Diagnostic Laboratory (SDL) at Montana State University (MSU) is provided as a service to the citizens of Montana through MSU and MSU Extension to provide plant pest identification and integrated pest management education. In 2016, the SDL conducted a total of 3,514 plant disease, insect, and plant identification diagnoses in 10 states and 55 counties in Montana.

Total Economic Impact:

\$4,795,103

Estimated savings reported by clients due to implementing SDL recommendations ($n=73$)*

By the numbers- results of 2016 client survey ($n=162$)*:

- 44% of clients surveyed indicated the value of SDL recommendations was > \$100 for their specific issue
- 96% of clients surveyed are likely to recommend the service to others
- 90% of clients surveyed reported the SDL influenced their pest management decision

Clients stated the following outcomes of interactions with the SDL were the most beneficial to them in 2016:

- being able to manage and target pests with increased knowledge
- being able to confirm diagnosis and/or identification of a pest
- being more informed/knowledgeable about the pests in their environments
- having the knowledge/confidence to follow the recommendations either presently and/or in the future to prevent the same problems from occurring

Quotes from Clients:

- “The lab is an excellent investment of public funds; if you look at funding the lab just in investment terms, I'd have to bet the return on the investment for the public must be at least several times the cost.”
- “I found out how easy it could be to access reliable information to enhance the productivity of my home garden.”
- “I am more informed as to which plants to spend my limited energy on.”
- “Our plant problem was caused by drought and not disease. It saved us a lot of money knowing that spray or seed treat wouldn't have made a difference. Not to mention ease of mind!”
- “Identification and/or verification of plant pathogens certainly has helped in implementing treatment plans and reinforcing diagnosis with clients.”
- “I was able to confirm a diagnosis of a crop disease I had never seen before. White mold may not have been new this year, but it was the first year it was widespread and caused economic losses.”
- “Keep it up! Where else would we get this critical information for farmers (and all the other users)? I am very grateful for everyone's efforts and their courtesy in providing information.”

*Data from report, “Schutter Diagnostic Lab Evaluation- 2016” compiled by Yellowstone Evaluation Services, LLC.

Contents

Introduction	3
2016 Plant Disease Summary	3
Trends for 2016	4
Total Disease Identification and Sample Source	4
Additional Activities	6
2016 Insect Identification Summary	8
Impacts	8
Sample Summary	8
Outreach, Education, & Media Efforts to Increase Urban Entomology and IPM Knowledge	10
2016 Weeds Lab Summary	12
Trends for 2016	12
Plant Identification Activities	12
Samples by Status and Type	13
Mushroom Identification	14
Herbicide Injury Diagnosis	14
Education and Outreach Activities	15

Introduction

Montana State University (MSU) and MSU Extension provide plant pest identification through the Schutter Diagnostic Laboratory (SDL). The mission of the SDL is to provide the citizens of Montana with the highest quality diagnostic laboratory support. The SDL safeguards Montana agriculture, landscapes and public spaces from plant pests by offering identification services, management advice, and education. Our recommendations are based on integrated pest management (IPM) principles, which is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic and environmental risks. The mission of the SDL also includes the early detection of new and invasive pests that may pose a risk to Montana and to the U.S., to prevent significant limitations to agricultural production and international trade.

In 2016, the SDL conducted a total of 3,514 plant disease, insect, and plant identification diagnoses (Table 1). Two first species reports for Montana were confirmed through the SDL. Dr. Kerzicnik diagnosed for the first time the white satin moth, *Leucoma salicis*, in Gallatin, Silver Bow, Cascade, and Big Horn Counties. The white satin moth is a serious defoliator of willows, aspens, cottonwoods, and poplars. Another first report was issued by Noelle Orloff, who identified the weed cutleaf teasel (*Dipsacus laciniatus*), which is listed as a noxious weed in Colorado, Iowa, Missouri, and Oregon.

In addition to diagnostic services, SDL staff provided outreach, research, and educational materials. Staff published three refereed publications, 15 educational publications and articles, and provided over 65 workshops and presentations on topics relevant to plant pest identification and integrated pest management in urban and agricultural settings.

Table 1. Samples submitted to the SDL in 2016.

	Number of Diagnoses
Plant Disease	2,227
Insect & Spider Identification	752
Plant & Mushroom Identification	492
Herbicide Injury	65
Total	3,536

2016 Plant Disease Summary

Diagnostic Staff:

Dr. Mary Burrows, Plant Pathologist

Dr. Eva Grimme, Plant Disease Diagnostician & Associate Extension Specialist

Extension Specialists:

Dr. Barry Jacobsen, Plant Pathologist, row crops (sugar beets, potatoes, dry beans), mycotoxins

Toby Day, Extension Horticulture Specialist

Cooperators:

Dr. Cathy Cripps, Mushroom Identifications

Dr. Mareike Johnston, Plant Pathologist

Priyanka Kudalkar, MS, Research Assistant

Trends for 2016

Due to extensive hail damage in 2015 and favorable fall temperatures among other circumstances, an epidemic of wheat streak mosaic virus of wheat and barley occurred in most wheat-growing areas of Montana. A record high of 376 samples were submitted for diagnosis of wheat streak mosaic virus to the SDL in 2016. The SDL also received an increasing number of pulse crops infected with white mold, *Sclerotinia sclerotiorum*. A high incidence of Fusarium head blight (scab) of durum in northeastern Montana was reported.

Green ash and maple trees samples were diagnosed with anthracnose (caused by different fungi) early in the year following the moist spring in 2016. Throughout the year, deciduous and evergreen samples were submitted with symptoms of cytospora canker. We also received few apple tree samples that were infected with nectaria canker or fire blight. In late summer, marssonina leaf spot was evident on aspen, poplar and cottonwood trees. Bacterial leaf spot on tomato, peppers, shrubs, and trees was a common occurrence this season. We reported our first case of rust on cottonwood trees this year.

Total Disease Identification and Sample Source

In 2016, the SDL made 2,227 plant disease diagnoses, an increasing number compared to 1,205 diagnoses in 2015. Samples were mainly submitted from 48 counties in Montana (Table 2). Three samples were submitted from out of state, two from Colorado and one sample from Wyoming. The highest submissions were from Gallatin, Hill, Choteau, and Yellowstone County. Sample submissions were greatest in May, June, and July with 298, 361, and 240 samples, respectively.

Table 2. Disease sample submission by county in 2016

Gallatin	274	Beaverhead	22	Dawson	7
Hill	152	Sheridan	20	Fallon	7
Chouteau	125	Toole	20	Jefferson	7
Yellowstone	64	Fergus	17	Judith	7
Pondera	55	Big Horn	14	Lincoln	7
Liberty	52	Falthead	14	McCone	7
Teton	51	Lake	14	Granite	5
Ravalli	49	Richland	12	Pasco	4
Cascade	44	Valley	12	Sweet Grass	4
Phillips	41	Carbon	9	Wibaux	4
Glacier	35	Madison	9	Musselshell	3
Blaine	28	Missoula	8	Powell	3
Park	27	Praire	8	Rosebud	3
Lewis and Clarke	26	Sanders	8	Treasure	3
Roosevelt	25	Broadwater	7	Carter	2
Silverbow	25	Daniels	7	Garfield	2

Samples were mainly submitted by extension agents (75%; Figure 1). As compared to last year (37%), the non-extension commercial sources amounted to a lower percentage (17%). Commercial samples, extension and non-extension combined, accounted for 58% of the samples. The highest number of samples came from growers/farmers (17.72%), agribusiness (11.71%), homeowners/gardeners (11.31%), and companies/firms (5.62%). Other submitters include crop consultant, arborists, and educators.

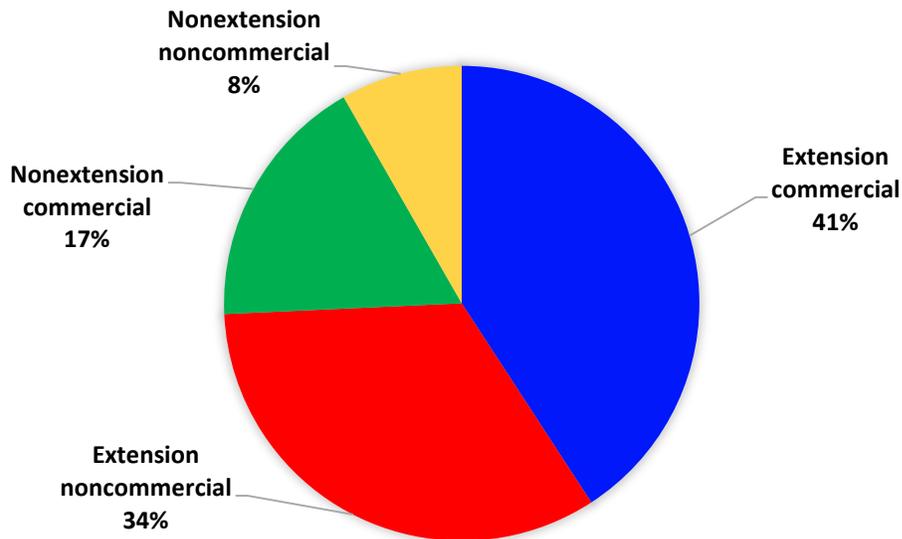


Figure 1. Sample submission by source

Turf samples accounted for 3.74% and ornamental samples, including deciduous and evergreen woody ornamentals, accounted for 22% of the total samples submitted to the SDL.

(Figure 2). This is a slight decrease in sample numbers of woody ornamentals as compared to 2015. However, small grains samples, primarily wheat, accounted for 44.32% of disease samples, a 10% increase in sample numbers compared to the previous years.

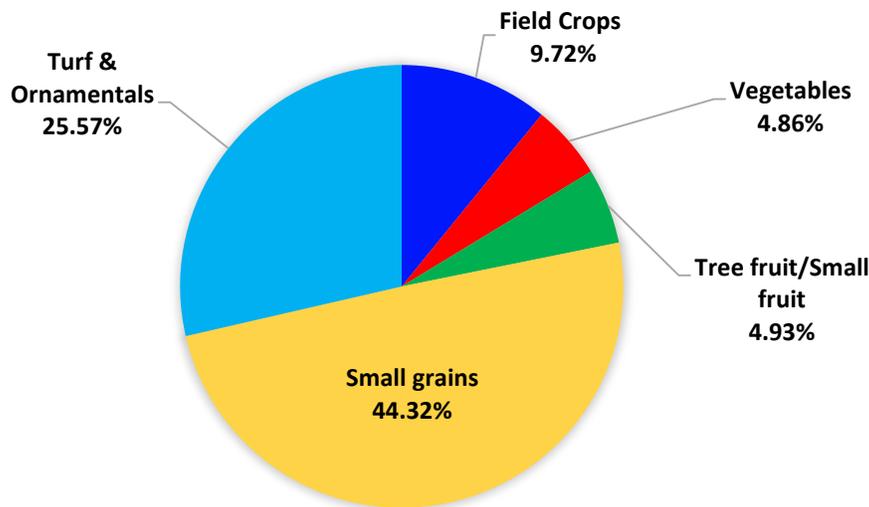


Figure 2. Distribution of disease samples by host category.

Additional Activities

We continued to assist the Montana Department of Agriculture CAPS surveys by processing and analyzing 120 samples with ELISA for Plum Pox Virus monitoring. Plum Pox Virus (PPV) is a federally regulated virus of fruit trees.

Dr. Grimme coordinated the annual webinar series of the Great Plains Diagnostic Network (GPDN) on topics including spiders – friends or foes, digital resources for diagnosticians, STAR-D – progress update, poisonous plants of the western US, late blight in Montana, seedborne pathogens of pulse crops in Montana, real-time PCR assay for detection and quantification of *Diaporthe helianthi*, and wheat streak mosaic virus epidemics in the great plains: a review. The series consisted of eight presentations during January to March 2016 and was attended by 123 individuals. The complete list and recordings of the seminars can be found at the GPDN website www.gdpn.org.

Certifications

Dr. Eva Grimme completed the Plum Pox Virus ELISA proficiency test and continued as a USDA/APHIS PPQ certified diagnostician to screen for PPV.

Montana AgAlerts

Thirty AgAlerts were received by (currently) 957 subscribers by email and 72 subscribers by text message. Popularity of the AgAlerts website increased (18,100 sessions, a 15% increase over 2015) and 37% were new users. The majority of users (>1,000/location) are from Great

Falls, Bozeman, Billings; 63% are returning visitors, indicating the information on the site is valuable to the majority of visitors.

Montana Urban Alerts

The Urban Ag Alert system is a special mailing list server that is managed by the SDL that was started in spring 2015. The system is intended to inform extension agents, landscape professionals, arborists, city foresters/managers, and homeowners about current issues of plant diseases, insects and horticultural topics in general in the urban landscape.

- 4 articles were distributed to 149 subscribers addressing specific plant diseases in the urban environment.

2016 Insect Identification Summary

Diagnostic Staff:

Laurie Kerzicnik, Insect Identification Diagnostician

Extension Specialists:

Toby Day, Horticulture Specialist and Montana Master Gardener Coordinator

Other Cooperators:

Dr. Casey Delphia, Research Associate/Entomologist, MSU

Dr. Michael Ivie, Systematic Entomologist, MSU

Ian Foley, Montana Department of Agriculture

Dr. Justin Runyon, Entomologist, US Forest Service

Impacts

- Confirmed insects that were submitted/suspected as bed bugs were not bed bugs in four cases, preventing unnecessary treatment costs.
- Spider awareness increased and fear of spiders decreased as spider sample submissions decreased by 68% from 2015-2016.
- Five workshops on the Emerald ash borer reaching 71 participants throughout the state resulted in increased understanding and awareness of the potential invasive insect.

Sample Summary

In 2016, a total of 752 arthropod diagnoses were conducted (Table 3). Of the identifications, 94% were insects/other arthropods and 6% were spiders.

Table 3. Numbers of insect, spider, and other arthropod diagnoses in 2016.

	Number of Identifications
Insects/Other Arthropods	695
Spiders	57
Total	752

Of the insect samples submitted, field crops (primarily small grains and alfalfa) accounted for 35%. In wheat, the insects were dominated by thrips, brown wheat mites, and Russian wheat aphids. In barley, Russian wheat aphids and brown wheat mites were common. Alfalfa insects included alfalfa weevils and pea aphids. Lentils had pea aphids and thrips. Pea weevils were common in field peas.

The other 65% of the samples consisted of trees, shrubs, vegetables, and household pests. The greatest number of tree samples came from ash, aspen, poplar, cottonwood, spruce, oak,

cherry, apple, elm, maple, plum, pine, and willow trees (Table 4). The bush/shrub hosts were cotoneaster, currant, dogwood, gooseberry, hackberry, juniper, arborvitae, lilac, mulberry, and rose. The vegetable/fruit hosts consisted of beans, cucumbers, kale, squash, potatoes, strawberries, raspberries, and tomatoes. Some of the common insect pests associated with these vegetables/fruits included two-spotted spider mites, thrips, and spotted snake millipedes (potatoes and strawberries). Flea beetle and flea beetle damage were common on tomatoes and potatoes.

Table 4. Arthropods associated with tree hosts submitted to the Schutter Lab in 2016.

Tree Host	Insect
Apple	Appleleaf blister mites
Ash	Eriophyid mites Western ash bark beetle Ash plant bug
Aspen/poplar/cottonwood	Poplar vagabond aphid Two-spotted spider mite Poplar borer Aspen leaf miner Poplar bud gall mite Poplar blackmine beetle
Birch	Aphids Birch leafminer
Boxelder	Erineum galls Boxelder psyllid
Cherry	Green peach aphid Black cherry aphid Leafcurl plum aphid Erineum galls
Dogwood	Douglas-fir twig beetle Flat-headed fir borer
Elm	Elm leafminer Eriophyid mites European elm scale
Fir	Spruce spider mite
Honeylocust	Honeylocust spider beetle Honeylocust leafhopper
Maple	Eriophyid mites (finger & erineum galls)
Oak	Gall wasp (<i>Callirhytis</i> sp.) Oak rough bulletgall wasp
Pine	Pine needle scale Pine sawyer beetle

Plum	Leafcurl plum aphid
Spruce	Pine needle scale Cooley spruce gall adelgid Spruce spider mite Spruce bud scale White sitka spruce weevil
Willow	White satin moth

Household

A series of home-invading insects were identified. An invasive root weevil, *Cathormiocerus spinosus*, was common in addition to three other weevils, the strawberry root weevil, the black vine root weevil, and *Romauldis bifoveolatus*. The Western conifer seed bug, garden millipedes, ants, green lacewings, and boxelder bugs were also common home invaders. Carpet beetles were submitted year round with concern over control and new infestations. Bed bugs samples were submitted from several counties, suggesting a further need for awareness and prevention throughout the state. Termites were also found in Gallatin, Missoula, and Cascade counties in April. Springtails were also found to be home invaders in several counties this year. Clover mites were common in late spring.

Spiders

Spider awareness and outreach has effectively reached many individuals, as spider submissions to the SDL have decreased by 68%. Spider samples constituted 25% of the home samples submitted. Of these samples, 9% were submitted for concerns about the hobo spider and whether it is harmful to humans. These diagnoses were followed with reports, which allowed for many clarifications of misinformation about spiders, particularly about the hobo spider and the brown recluse. We don't have the brown recluse documented in Montana, and the hobo spider is not considered a harmful or dangerous spider.

Outreach, Education, & Media Efforts to Increase Urban Entomology and IPM Knowledge

I gave twenty-four presentations on urban-related arthropod issues throughout the state in 2016.

Workshops

I was part of five workshops this year to promote awareness for bed bugs and early detection efforts for a potential invasive that has not yet been detected in the state of Montana, the Emerald ash borer. Extension agents, sanitarians, health officials, city foresters, and community members attended the workshops. Montana, compared to other states, has a significant percentage of ash in many of its communities and has to be proactive in preparing for

its arrival. Concerning bed bugs, awareness and prevention are critical to prevent infestations of the pest. I also did a spider identification workshop for researchers in Sidney, MT.

Media

- Montana Ag Live, Panelist. (Apr 10, May 15, Jun 5, Sep 25, Oct 2).

Publications

- Kerzicnik LM. Brown marmorated stink bug. AMTOPP newsletter. Sep 2016.
- Dolan AC, CM Delphia, and **LM Kerzicnik**. Bumble bees in Montana. MontGuide MT201611AG. Jul 2016.
- Kerzicnik LM. White satin moth. AMTOPP newsletter. Jun 2016.

Urban Ag Alerts

The Urban Ag Alert system is a listserv that is managed by the SDL and was started in spring 2015. It is intended for extension agents, landscape professionals, arborists, city foresters/managers, and any other people interested in trends in urban pests (both insects and disease), environmental stresses, and other urban-related management issues with woody ornamentals and vegetables.

- 7 articles were distributed to 149 subscribers on trends and issues with insects in the urban environment.

Grants and Awards

L. Kerzicnik. 2015-2018. IPM of Insect Pests of Fruit Trees. Specialty Crop Block Grant Program, Montana Department of Agriculture. \$53,000.

Other Activities

- National Plant Diagnostic Network Program Planning Committee, March 2016 meeting.
- MSU Extension, “Ask an Expert”.
- Ag Agent Update Planning committee

2016 Weeds Lab Summary – Plant ID, Mushroom ID, and Herbicide Injury

Diagnostic Staff

Noelle Orloff- Plant Identification Diagnostician and Associate IPM Specialist

Extension Specialists

Dr. Jane Mangold

Dr. Fabian Menalled

Other Cooperators

Dr. Cathy Cripps, Mushroom identification

Trends for 2016

We identified a new species for the state of Montana, cutleaf teasel (*Dipsacus laciniatus*). This species is listed as a noxious weed in Colorado, Iowa, Missouri, and Oregon. We also confirmed several priority 1B Montana noxious weeds that were first reports for specific counties; purple loosestrife was confirmed for the first time in Valley County, rush skeletonweed was confirmed in Beaverhead County, and Bohemian knotweed was confirmed in both Toole and Silver Bow Counties. Finally, we observed an increase in the number of vegetable submissions we suspected were injured by herbicide carryover in soil amendments.

Plant Identification Activities

In 2016, the SDL processed 400 physical specimens for plant identification, or 21% fewer than in 2015 (508). Part of the reason for the decline in physical samples may have been the 300% increase in samples submitted and identified via emailed or texted photos (152 in 2016 compared to 40 in 2015). Prompt, same day electronic identifications enable clients to immediately apply a management strategy when appropriate. They also alleviate costs and time spent on shipping physical samples.

Physical plant samples came from 47 of 56 Montana counties (84%) and one county in Florida. The highest submission numbers were from Gallatin, Ravalli, and Yellowstone Counties with 81, 39, and 27 sample submissions, respectively. Submissions were greatest in May, June, and July with 72, 88, and 78 physical samples submitted, respectively.

The 154 email and text photo plant ID submissions originated from two counties in Idaho and 37 counties in Montana. The highest submission numbers were from Cascade and Gallatin Counties which each had 13 submissions. Another source for electronic plant ID diagnosis that the SDL is involved with is the “Ask an Expert” web service through eXtension where the diagnostician assisted 57 Montana clients who submitted photos for plant identification.

Noncommercial sources (homeowners, small acreage landowners) accounted for 77% of physical sample submissions. Extension noncommercial was the most common submission type, accounting for 55% of all samples (Figure 3). These samples are typically from residential or small acreage landowners who take a plant to their county Extension agent for identification and need information on how to control the plant in their gardens or pastures. Agents submit the sample to the

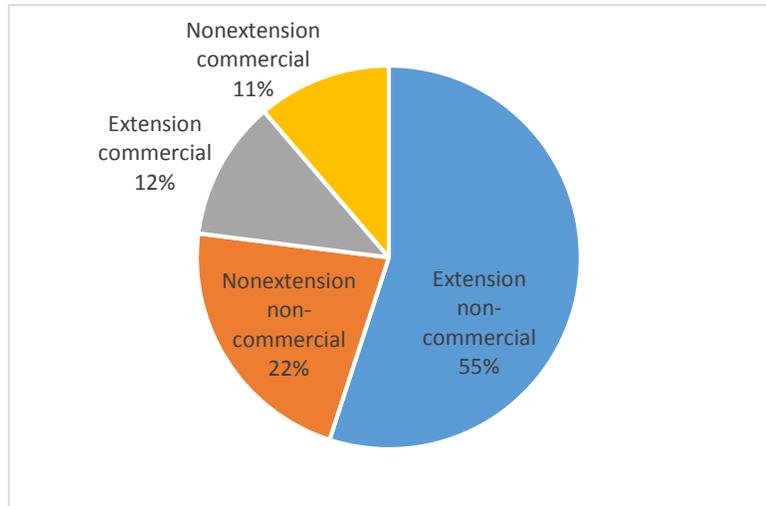


Figure 3. Physical plant identification sample submissions by source.

SDL if they are not sure of the identity of the specimen. Nonextension noncommercial samples accounted for almost a quarter of submissions. Samples from commercial sources (whether extension or nonextension) accounted for 23% of all submissions. These include farmers, ranchers, consultants, nurseries and representatives from agribusinesses.

Samples by Status and Type

The 554 samples submitted through physical samples and email represented 334 unique species. Forty eight percent or 269 samples were exotic plants representing 160 unique species. The most commonly submitted exotic species were roving bellflower (*Campanula rapunculoides*, 9), common bluemustard (*Chorispora tenella*, 6), and cheatgrass (*Bromus tectorum*, 6). 177 specimens were native plants, representing 129 unique species. The most common native species were dotted blazing star (*Liatris punctata*, 7), chokecherry (*Prunus virginiana*, 5), and hairy evening primrose (*Oenothera villosa*), povertyweed monolepis (*Monolepis nuttalliana*), and horseweed (*Conyza canadensis*) which each had four submissions.

One specimen submitted to the SDL for plant identification in 2016 was a new record for Montana. This species was cutleaf teasel (*Dipsacus laciniatus*). This species is listed as a noxious weed in Colorado, Iowa, Missouri, and Oregon, but it is not a regulated plant in Montana. Its close relative common teasel (*Dipsacus fullonum*) is known in Montana. We were also able to confirm a first report of greater knapweed (*Centaurea scabiosa*) for Cascade County.

Twenty eight specimens of state-listed noxious weeds and regulated plants were submitted representing thirteen unique species (Table 5). Several species submitted for identification were priority 1B species, meaning they have limited distribution in Montana and early detection of these species is important. These species included Bohemian knotweed (*Polygonum x bohemicum*), purple loosestrife (*Lythrum salicaria*), and rush skeletonweed (*Chondrilla juncea*). To our knowledge four of these reports for priority 1B species were first reports for a county;

purple loosestrife was confirmed for the first time in Valley County, rush skeletonweed was confirmed in Beaverhead County, and Bohemian knotweed was confirmed in both Toole and Silver Bow Counties. We also received specimens suspected of being high priority noxious weeds that were not. For example, three specimens suspected to be Montana’s newest noxious weed, common reed (*Phragmites australis* spp. *Australis*) were submitted to the lab and all of these samples were identified as the native subspecies (*P. australis* spp. *Americanus*). The SDL provides a valuable resource where land managers can get accurate information about suspected problematic plants such as these high priority noxious weeds.

Table 5. State listed noxious weeds and regulated plants submitted to the SDL in 2016. Counties listed in italics represent first reports for that county.

Species	County	Priority
Bohemian knotweed	<i>Silver Bow, Toole</i>	1B
Canada thistle	Broadwater, Cascade	2B
Cheatgrass	Cascade, Custer, Flathead, Gallatin, Silver Bow, Yellowstone	3
Dalmatian toadflax	Lewis and Clark, Ravalli	2B
Eurasian watermilfoil	Gallatin	2A
Field bindweed	Beaverhead, Yellowstone	2B
Hoary alyssum	Gallatin, Sweetgrass	2B
Houndstongue	Cascade, Phillips, Ravalli	2B
Purple loosestrife	<i>Valley</i>	1B
Rush skeletonweed	<i>Beaverhead</i>	1B
Russian knapweed	Judith Basin, Ravalli	2B
Russian olive	Glacier	3
Spotted knapweed	Gallatin	2B

Mushroom Identification

In addition to plants we also identify mushroom specimens. In 2016 Dr. Cathy Cripps assisted the SDL by identifying 71 mushroom samples, an increase of 25% compared with 2015 sample numbers (55). These specimens were of 43 different species. Ninety seven percent of these samples were from noncommercial sources, and were found in many cases in lawns, gardens, or natural areas. Clients are often interested in edibility or toxicity of mushrooms, and proper identification is vital for these types of questions.

Herbicide Injury Diagnosis

We assessed 65 samples for potential herbicide injury in 2016, about the same number submitted in 2015 (66). Of these, 30% were submitted from an agricultural setting, while 70% were submitted from urban or residential settings. We suspected herbicide injury to be affecting

samples in 80% of these cases.

Since 2011, the SDL has been tracking vegetable samples damaged by compost or soil contaminated with plant growth regulator (PGR) herbicides (e.g. picloram, aminopyralid, clopyralid, etc). When we receive these samples, we call the client to explain how this can occur, and we send detailed reports about how to prevent it in the future. Numbers of samples showing suspected PGR damage has not shown a significant decline over this time period, indicating that this issue continues to be a problem (Table 6). We received 17 samples that we suspected were affected by plant growth regulator herbicide carryover in soil amendments in 2016, and these were from both commercial and non-commercial sources.

Year	Number of Samples
2011	25
2012	22
2013	18
2014	12
2015	8
2016	17

Of the 24 commercial agricultural samples we assessed for herbicide injury, we recorded 14 cases where symptoms were consistent with herbicide injury were from in-crop applications of herbicide that resulted from situations such as mistakes in tank mixes and interactions between weather events and herbicide applications. We also received one sample from a pulse crop that we suspected was affected by herbicide carryover. Most of these cases were in line with warnings on herbicide product labels, such as warnings about frost soon after application or labelled intervals between persistent herbicide application and planting legumes.

The other main group of herbicide injury cases was those in turf and ornamental settings, where we assessed 19 samples we suspected were affected by herbicide injury symptoms. Of these 19 samples, two had symptoms consistent with sub-lethal glyphosate injury, one was suspected to have been killed by glyphosate drift, and 16 samples had symptoms of PGR herbicide injury that we suspected were from lawn or roadside weed applications. Several of these lawn or roadside PGR applications were off-label use of an herbicide not labelled for residential turf (i.e. aminopyralid or metsulfuron). Others showed symptoms of PGR injury, but there was no history of applying 2,4-D or dicamba on the property. In these cases, we suspected drift may have occurred.

Education and Outreach Activities

We provided 12 workshops or interactive trainings in 2016 that reached 550 participants. These trainings covered topics including plant anatomy, noxious weed and invasive annual grass identification and management, first detector training for phragmites, grass identification, use of a dichotomous key, and identification of common or important poisonous rangeland plants. We also posted plant ID information and trends from SDL on our Facebook page. Our plant ID related posts reached over 10,000 people in 2016.

Phragmites australis spp. *australis* was listed on Montana’s noxious weed list in 2015. The diagnostician developed and published, “Watch out for Phragmites” (EB4611) to provide

information about identification, history, ecology, and management of this species. This guide also focuses on how to differentiate between the exotic phragmites on the noxious weed list and a very similar native subspecies.

Herbicide carryover in soil amendments continues to be an issue for gardeners and vegetable farmers in Montana. The diagnostician contributed to, “How to Prevent Non-Target Injury of Broadleaf Crops and Vegetables by Residual Herbicides” (MT201612AG) to help homeowners and herbicide applicators avoid issues with persistent herbicides stemming from contaminated soil amendments.

The diagnostician contributes to the Monthly Weed Post, a 2-page bulletin featuring a noxious weed, interesting research or timely issue related to weed management; http://www.msuextension.org/invasiveplants/monthly_weed_post.html. The plant identification diagnostician also compiles and assists with editing the spring and fall editions of the Montana Integrated Pest Management Bulletin (<http://www.pesticides.montana.edu/news/bulletins/>), which provides timely pest management and pesticide education articles for Montana homeowners, pesticide applicators, farmers, and ranchers.

Goals for 2017 are to continue to offer accurate, timely reports on plant identification and weed management; provide education on weed and native plant identification and promote IPM practices to manage weeds; develop identification materials for species commonly used in landscaping in Montana; and assist with developing curriculum and resources focused on the issue of herbicide carryover.